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ABSTRACT

This paper presents a set of guidelines for the design of computer-supported distance multimedia that enables collaborative distance learning. The first section provides an overview of distance learning and discusses teacher and student roles in a collaborative distance learning environment. Conditions for effective collaborative learning are listed in the second section, including: student interdependence and personal responsibility; instructors who are engaged in a facilitating, reflecting, and coaching role; strategies that maximize student interaction and organize formal and informal testing to ascertain students' progress; identification of effective cooperative processes and student interaction in a collaborative learning environment; accessibility to the distance learning system and materials, and stimulation of student interest; planning; and effective use of technology. The third section presents the following principles for designing and developing computer-mediated collaborative open and distance learning (ODL) courseware: careful organization; including questions for discussion or response; connecting course materials to current events or to students' experiences; deciding how to display items; avoiding hyperinteractivity and cognitive overload; balancing the need for multimedia effects; including online and off-line collaborative interactions and peer-group assessment; providing opportunities for self-assessment; clearly defining instructional and learning objectives; and including one or more "seminar" type segments. (Contains 35 references.) (DLS)

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Guidelines for the Design and Development of Computer-Mediated Collaborative Open Distance Learning Courseware

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Abstract: Open and Distance Learning (ODL) substantiated by computers and computer networks and collaborative learning may provide an answer to the inefficiencies of the individualistic ODL which dominates present ODL systems. The successful integration of computer-supported collaborative learning in the development of ODL multimedia courseware necessitates an answer to the following two questions. First, under what conditions does collaborative computer-supported distance learning work? Second, how can we design multimedia distance courseware? This paper attempts to provide a set of guidelines for the design and development of computer-supported distance multimedia which reflect these two questions.

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Introduction

Open and Distance Learning (ODL) has been witnessed an increased development, acceptance and recognition as an innovative and productive delivery mode of instruction and learning. However, most distance learning has taken place using an individualistic or self-study strategy, whereby the emphasis is placed on the distance and/or the learner, but not on the learning [Amundsen 1993]. The current widespread interest in the potential of collaborative or co-operative learning methods [e.g., Whipple 1987; Chung 1991; Mandl and Renkl 1992; Somervell 1993; Meloth and Deering 1994], on the one hand and of computer-supported conventional and distance learning [e.g., Nastasi and Clements 1993; Wild and Winniford 1993; Steeples et al.1994; Woodruff 1996], on the other hand, open up an interesting intersection. The concept of computer support implies the use of multimedia and computer networks as communication tools by learners and instructors to achieve certain teaching and learning goals and objectives [cf. Kaye 1991; McConnell 1991;1994; Riel and Harasim 1994]. The concept of collaborative learning is an umbrella term. Some people use the terms groups, co-operation and collaboration interchangeably. Others, try to see a slight but important difference. As pointed out in the editorial of the Journal of Computer Assisted Learning, «At a purely cognitive level, cooperation and collaboration may be quite similar but at an intentional and contextual level the processes seem to be distinct» [JCAL 1996, p.65]. Here, these terms will be used interchangeably. Group, co-operative or collaborative learning has been defined as learning that occurs through interaction with a peer group [Hiltz 1995], is based on learning principles relating to individuals within groups [Slavin 1995] and it involves the "active construction" of knowledge [Idrus 1993; McConnell 1994]. It has been researched and shown, that when collaborative learning is used appropriately, it improves student behaviour and attendance, increases liking of peers and of school, promotes positive interaction of learners in small groups [Lyman and Foyle 1990;1991]. It also improves student socio-cognitive achievement [Lyman and Foyle 1988; Mevarech and Kramarski 1992; Slavin 1995]. In a collaborative learning environment, both teachers and learners are active participants in the learning process, in which knowledge is not something that is merely transferred to students but rather something that emerges from active participation in the learning process. This view of collaborative learning is related to a constructivistic approach, which posits a view of knowledge as a construction based on previous knowledge or experiences, mental structures, and beliefs that continually evolve and do not exist independent of human experience. From a constructivist point of view, each learner actively constructs and reconstructs his or her understanding rather than receiving it from a more hierarchical and authoritative source such as a teacher or a textbook. The notion of the organism as "active" - not just responding to stimuli, or storing up information, is at the heart of collaborative and constructivist conceptions of learning. Active learning is when the learner takes responsibility for what he or she wants to learn - making decisions about the "what" and the "how" [Bentley and Watts 1989; Bruner 1986]. Only in groups it is possible to envisage pupils talking about their work to any significant extent" [Eraut and Hoyles 1989]. Cooperative learning while doing group problem solving can improve students' team work, mutual

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respect and better patterns of communication [Mittlefehldt 1991]. Successful implementation of cooperative or collaborative learning in a certain subject depends, to a great extent, on the climate of the classroom, which should be considered before longer cooperative activities are used [Lyman and Foyle 1991].

In a collaborative distance learning environment, the teacher's fundamental roles can be categorized into two categories: instructional roles and organizational roles. In the context of instructional roles, teachers act as reflective practitioners, as facilitators, and as scaffolders. While in terms of organizational roles, teachers act as resource, technology managers, and curriculum developers. Future teachers ought to analyze and reflect on (1) the pedagogical and curriculum means used to attain educational aims, (2) the underlying assumptions and consequences of pedagogical action, and (3) the moral implications of pedagogical actions and the structure of schooling [Liston and Zeichner 1987]. "When teachers themselves adopt a reflective attitude toward their teaching, actually questioning their own practices, then they engage in a process of rendering problematic or questionable those aspects of teaching generally taken for granted" [Smyth 1984 p. 60]. Implementing reflective inquiry based on critical theory is not a panacea to the problems faced in education [Ross and Hannay 1986]. In "critical reflection", the moral and ethical issues are considered along with the means and ends [Sparks-Langer et al. 1990]. The facilitating and scaffolding teacher's role is to have pupils regard each other as learning resources rather than as competitors and depend solely on the teacher as an instructor and leader. This does not imply that the teacher abandons all authority in the classroom. In fact, the teacher plays an important role as an information resource, as guide and as faciltator of the learning process.

In general, the strategic teacher's role in the "collaborative distance learning environment" is to provide a structured social environment in which students develop their capacity for self-regulation, cooperation, mutual respect and solidarity, critical and reflective thinking and engagement in the learning task to mention some.

The successful integration of computer-supported collaborative learning in the development of ODL multimedia courseware necessitates an answer to the following two questions. First, under what conditions does collaborative computer-supported distance learning work? Second, how can we design multimedia distance courseware? On the basis of the extended literature review outlined here and personal experience, a number of conditions and principles have been identified and appropriately modified to support the design and development of computer-supported collaborative ODL materials.

Conditions for Effective Collaborative Learning

- Students must see themselves as positively interdependent so that they take a personal responsibility for working to achieve learning goals;
- Instructors must be engaged in a facilitating, reflecting, and coaching role, teach the process skills necessary to work in groups and provide group rewards for engaging in cooperative interactions effectively. They must also specify instructional and collaborative learning objectives, usually in discussion with the learning groups.
- Introduce strategies that maximise student interaction and organise formal and informal testing to ascertain students' socio-cognitive progress.
- Identify which types of cooperative process are more effective than others and understand how students interact in a collaborative learning environment to advance their knowledge and skills.
- Ensure accessibility to the distance learning system and instructional material, stimulate the students' interest in the subject and their motivation to learn and respond to students' enquires and contributions.
- Plan before implement collaborative teaching, carefully explain the task, the goal structure and the learning activity and provide sufficient and meaningful feedback.

- The effectiveness of collaborative distance teaching and learning is highly dependent on how well the technology involved can be used, in terms of operation, understanding of its potentiality, and of the teaching and learning techniques associated with that technology.

Principles for Designing and Developing Computer-Mediated Collaborative ODL Courseware

- Consider the "lost in hyperspace" problem by organising the instructional material in an appropriate way and structure, avoiding unnecessary breaking of topics, grouping small topics whenever possible, limiting the number of links, providing standard links whenever possible and avoiding special links that seem to be unpredictable.

- Courseware should include questions for discussion or response, rather than simply representing one way transmission of "knowledge".

- Include a table of contents, an alphabetical index of key topics, questions and assignments that enable students to present, analyse, discuss and synthesise problems or issues. Connect the course materials to current events or to students' experiences.

- Decide what, where and how to display items. Special consideration must be given to highlighting items, text legibility and the structure of the instructional material in a coherent pattern and sequence.

- Avoid hyperinteractivity and cognitive overload. Do not overload the user with meaningless animation, video, pictures, in terms of learning.

- Balance the needs of multimedia effects (graphics, text, sound, video, animation, color etc.) by taking into consideration the nature and the priorities of the topic, the preferences, characteristics, styles, age, knowledge and perceptions of users, the instructional goals and objectives, the context of learning, the previous research and the costs of various media.

- Include on-line and off-line collaborative interactions that allow students to present drafts of written assignments to one another, critique one another's drafts, and then revise the draft on the basis of suggestions and reactions from the other students (peer-group assessment). Students may be divided into teams to present opposing viewpoints or conflicting views or different aspects on same topics or issues, perhaps with some members of the ODL class acting as respondents and "judges".

- Provide opportunities to students by giving them responsibility for monitoring and making judgements about aspects of their own learning (self-assessment). Students, for example, may be guided to prepare a self-assessment schedule. This is a document that students prepare towards the end of a course in which they summarise their learning and make judgements about it.

- Define overall and specific instructional and learning objectives clearly and measurable for each unit and sub-unit of the courseware.

- Include one or more "seminar" type segments in the courseware and let students do more than simply read instructional material. In other words, turn students as equal partners in the ODL collaborative interaction by giving them space to add links between existing topics, add new topics and annotations.

Concluding Remarks

Research on the use of collaborative learning in distance education mediated through advanced computer and communications technologies is not extensive. Evidence suggests that collaborative learning when properly designed, developed and implemented, has the potential for contributing to socio-cognitive knowledge and skills. As pointed by Mevaresh and Light [1992], co-operative or collaborative computer

learning environments can function as a 'mirror for the mind' and thus, enable us to investigate the mechanisms underlying cognitive and social developments. Implementing computer-mediated collaborative ODL requires an understanding of the conditions that facilitate its operation and the principles for design and development of such learning interactions. To sum up, to deepen our understanding of designing, developing and implementing collaborative computer-mediated distance learning strategies, we are in need of innovative theories of teaching and learning. In this paper, a number of guidelines have been provided which stem from accumulated knowledge, personal experience from my teaching and research work in the field of new information technologies in education as well as my involvement in the project EONT (An Experiment in Open Distance Learning using New Technologies) which has been funded by the European Union [Papaspyrou et al. 1996; Makrakis et al. in press].

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